

What is claimed is:

1. A method for producing a silicon carbide single crystal where a silicon carbide single crystal substrate that is a seed crystal is disposed inside a container and a source material for the silicon carbide single crystal is supplied to grow the silicon carbide single crystal on the silicon carbide single crystal substrate, the method characterized in that:

the silicon carbide single crystal substrate having a protection layer on a back surface of the substrate is supported mechanically, without bonding, by a supporting part disposed on a wall of the container; and

the source material is supplied to a front surface of the silicon carbide single crystal substrate to grow the silicon carbide single crystal on the front surface.

2. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate is supported such that the source material does not go to a back surface side of the silicon carbide single crystal substrate and the silicon carbide single crystal substrate contacts the supporting part with a minimum area.

3. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate is supported at only a periphery thereof.

4. The method for producing a silicon carbide single crystal

as in claim 1, further characterized in that a hook-shaped member to be the supporting part supports the silicon carbide single crystal substrate.

5. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate is supported at one position or a plurality of positions thereof.

6. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate in a polygonal shape is supported at vicinity of a plurality of vertices of the polygonal shape.

7. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate, which is in a hexagonal shape where a direction defined by a vertex and a diagonal vertex is set to be  $\langle 11\bar{2}0 \rangle$  and plane direction of the crystal is approximately (0001), is supported at vicinity of a plurality of vertices of the polygonal shape.

8. A method for producing a silicon carbide single crystal where a silicon carbide single crystal substrate that is a seed crystal is disposed inside a container and a source material for the silicon carbide single crystal is supplied to grow the silicon carbide single crystal on the silicon carbide single crystal substrate, the method characterized in that:

the silicon carbide single crystal substrate provided with a protection layer on a back surface is supported only at a periphery thereof by a supporting part disposed on a wall of the container; and

the source material is supplied to a front surface of the silicon carbide single crystal substrate to grow the silicon carbide single crystal on the front surface.

9. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate is supported with a gap between the protection layer and the wall of the container facing the layer.

10. The method for producing a silicon carbide single crystal as in claim 9, further characterized in that an adjusting member is disposed for adjusting width of the gap.

11. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that a temperature distribution of the silicon carbide single crystal substrate is controlled by disposing a temperature distribution adjusting member made of a material having thermal conductivity different from that of the supporting part such that the member faces the protection layer on the back surface of the silicon carbide single crystal substrate.

12. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate is supported such that the substrate closes

an opening formed in the wall of the container and a back surface side of the substrate is exposed to an outside space.

13. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the protection layer is a carbon layer, a layer of carbide with metal having high melting point, a silicon carbide epitaxial layer, a silicon carbide polycrystalline layer, a silicon carbide amorphous layer or a multilayer film constituted of above layers.

14. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the protection layer is a carbon layer, through which temperature of the back surface of the silicon carbide single crystal substrate is monitored by a radiation thermometer to feed back and control the temperatures of the back surface of the silicon carbide single crystal substrate while the silicon carbide single crystal is growing.

15. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide single crystal substrate provided with the protection layer on the back surface has a supported face and a growth face on the front surface, which is projected toward a supply source side of the source material from a plane including the supported face.

16. The method for producing a silicon carbide single crystal as in claim 1, further characterized in that the silicon carbide

single crystal substrate is prepared by forming a fine aperture on the back surface of the substrate and forming the protection layer on the back surface of the substrate either in concurrence with blocking the fine aperture by the protection layer or after blocking the fine aperture.

17. An apparatus for producing a silicon carbide single crystal where a silicon carbide single crystal substrate that is a seed crystal is disposed inside a container and a source material for the silicon carbide single crystal is supplied to grow the silicon carbide single crystal on the silicon carbide single crystal substrate, the apparatus characterized in that:

a protection layer is formed on a back surface the silicon carbide single crystal substrate;

a supporting part is provided on a inner wall of the container for disposing the silicon carbide single crystal substrate to a predetermined position in the container; and

the supporting part supports mechanically the silicon carbide single crystal substrate at a periphery of the substrate such that a gap with predetermined width is provided between the protection layer of the silicon carbide single crystal substrate and the inner wall of the container.

18. The apparatus for producing a silicon carbide single crystal as in claim 17, further characterized in that:

an opening is formed in a wall of the container at a position facing the protection layer of the silicon carbide single crystal

substrate;

a lid-shaped member is provided so as to close the opening and to adjust the predetermined width of the gap.

19. The apparatus for producing a silicon carbide single crystal as in claim 17, further characterized in that the protection layer is a carbon layer, a layer of carbide with metal having high melting point, a silicon carbide epitaxial layer, a silicon carbide polycrystalline layer, a silicon carbide amorphous layer or a multilayer film constituted of above layers.

20. An apparatus for producing a silicon carbide single crystal where a silicon carbide single crystal substrate that is a seed crystal is disposed inside a container and a source material for the silicon carbide single crystal is supplied to grow the silicon carbide single crystal on the silicon carbide single crystal substrate, the apparatus characterized in that:

the silicon carbide single crystal substrate having a protection layer on a back surface is disposed so as to close an opening formed in a wall of the container;

the silicon carbide single crystal substrate is supported by a supporting part disposed on a side wall defining the opening; and

the protection layer is exposed to an outside space.

21. A substrate for growing a silicon carbide single crystal, comprising:

a silicon carbide single crystal substrate, which is a seed crystal; and

a protection layer formed on a back surface of the silicon carbide single crystal substrate, wherein

a front surface of the silicon carbide single crystal substrate has a supported face and a growth face projecting from a plane including the supported face.

22. A method for producing a single crystal where a single crystal substrate that is a seed crystal is disposed inside a container and a source material for the single crystal is supplied to grow the single crystal on the single crystal substrate, the method characterized in that:

the single crystal substrate having a protection layer on a back surface of the substrate is supported either mechanically, without bonding, by a supporting part disposed on a wall of the container or by letting a periphery of the substrate adhere to the supporting part; and

the source material is supplied to a front surface of the crystal substrate to grow the single crystal on the front surface.

23. A method for heating a single crystal substrate disposed inside a container, the method characterized in that the single crystal substrate having a protection layer on a back surface of the substrate is heated while being supported mechanically, without bonding, by a supporting part disposed on a wall of the container.